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<p>(51) International Patent Classification⁴ : C05F 11/00</p>	<p>A1</p>	<p>(11) International Publication Number: WO 85/ 02398 (43) International Publication Date: 6 June 1985 (06.06.85)</p>
<p>(21) International Application Number: PCT/GB84/00407 (22) International Filing Date: 29 November 1984 (29.11.84) (31) Priority Application Numbers: 8331930 8401519 8407298 (32) Priority Dates: 30 November 1983 (30.11.83) 20 January 1984 (20.01.84) 21 March 1984 (21.03.84) (33) Priority Country: GB (71) Applicant: CLEARFIELD N.V. [NL/AN]; Schottegatweg Oost 130, Salinja, Curaçao (AN). (71)(72) Applicant and Inventor: KINAHAN, Edward; Anthony, Francis [GB/GB]; 'Weatherside', Hound Corner, Hamble Lane, Netley Abbey, Southampton SO3 5FT (GB).</p>	<p>(74) Agent: D YOUNG & CO.; 10 Staple Inn, London WC1V 7RD (GB). (81) Designated States: HU, JP, SU. Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>	
<p>(54) Title: FERTILIZER</p> <p>(57) Abstract</p> <p>An organic fertilizer is produced by adding biomix to seaweed, which is preferably in artificially dried particulate form, e.g. milled or granular dry seaweed, and autoclaving the resulting mixture, preferably with agitation, at a temperature of at least 80°C and a pressure of 50 to 100 psig (446 to 791 kPa) for a suitable period, typically 4 to 6 hours, followed by cooling, preferably with the agitation being continued during at least part of the cooling step. The mixture is then allowed to settle, preferably after being expelled, e.g. by compressed air, into a settling tank, and the supernatant liquid product is moved, e.g. by decantation, and may be filtered if necessary and if desired dehydrated to produce a concentrate.</p> <p style="text-align: right;">BEST AVAILABLE COPY</p>		

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FERTILIZER

This invention relates to fertilizers containing seaweed. Such fertilizers, which are well known, contain not only the principal plant nutrients nitrogen, phosphorus and potash (NPK) but also valuable trace elements such as boron, sulphur, cobalt, copper, iron, magnesium, manganese, molybdenum, sodium, zinc and the halogens chlorine, bromine and iodine. However, having regard to the needs of plants, provision of required amounts of NPK will give unnecessarily large amounts of the trace elements. Seaweed fertilizers can be augmented with inorganic sources of NPK, but this makes them of no appeal to the growing numbers of organic gardeners, horticulturalists and farmers.

The anaerobic digestion of organic materials of vegetable and animal origin, particularly the droppings of horses, cattle and poultry, results in the production of a fluid that is rich in assimilable NPK, as well as being substantially odourless. This fluid is known in the art and referred to herein as "biomix".

In accordance with the present invention, an organic fertilizer is produced by adding biomix to seaweed, which is preferably in artificially dried particulate form, e.g. milled or granular ~~dry seaweed~~, and autoclaving the resulting mixture, preferably with agitation, at a temperature of at least 80 °C and a pressure of 50 to 100 psig (446 to 791 kPa) for a suitable period, typically 4 to 6 hours, followed by cooling, preferably with the agitation being continued during at least part of the cooling step. The mixture is then allowed to settle, preferably after being expelled, e.g. by compressed air, into a settling tank, and the supernatant liquid product is removed, e.g. by decantation, and may be filtered if necessary.

The milled dried seaweed may previously have been saturated with water by soaking for up to 12 hours, and ~~then crushed~~, e.g. between rollers, to form a pulp.

The volume of biomix is preferably 4 to 8 (e.g. about 6) times the volume of dried seaweed. If seaweed pulp is used, this will itself have about 3 times the volume of the dried seaweed that it has been prepared

from. Before autoclaving, the mixture of biomix and seaweed may be allowed to stand for from 2 to 12 hours, to facilitate extraction of nutrients with the liquid and hence reduction of the time and energy expended in autoclaving. The period of standing must not be long enough to allow any degradation of the material. The preferred autoclave pressure is 70 to 90, e.g. about 80, psig (584 to 722, e.g. about 653, kPa) and the preferred temperature 90 to 105 °C.

The product obtained by the process of the present invention is a liquid containing all crop nutrients required by plants. ~~It is~~ completely organic and can be applied to agricultural, horticultural, orchard, garden and greenhouse plants as a foliar spray or soil fertilizer, or in hydroponic culture. The product can if desired be dehydrated to facilitate transport, being readily rehydrated by addition of water.



CLAIMS

1. A method of producing an ~~organic~~ fertilizer comprising adding biomix, viz. the fluid obtained by anaerobic digestion of organic materials of vegetable and animal origin, to ~~seaweed~~, autoclaving the resulting mixture at a temperature of at least 80 °C and a pressure of from 446 to 791 kPa for a suitable period, cooling the mixture, allowing it to settle, and removing the supernatant liquid as the desired product.
2. A method as claimed in Claim 1 in which the ~~seaweed~~ is in artificially dried particulate form.
3. A method as claimed in Claim 2 in which the dried seaweed has been saturated with water by soaking for up to 12 hours and then crushed to a pulp, and the biomix is added to the pulp.
4. A method as claimed in any preceding claim in which 4 to 8 volumes of biomix is used per volume of dried seaweed.
5. A method as claimed in any preceding claim in which the mixture is agitated during autoclaving and at least part of the cooling step.
6. A method as claimed in any preceding claim in which the autoclaving takes place over 4 to 6 hours.
7. A method as claimed in any preceding claim in which the product is filtered.
8. A method as claimed in any preceding claim in which the mixture of biomix and seaweed is allowed to stand for from 2 to 12 hours before autoclaving, to facilitate extraction of nutrients.
9. A method as claimed in any preceding claim in which the autoclave pressure is 584 to 722 kPa and the temperature 90 to 105 °C.



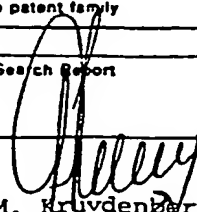
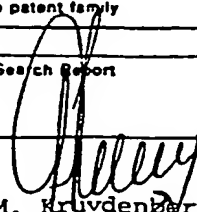
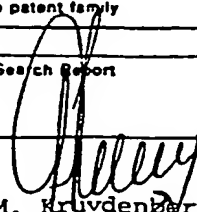
10. A method as claimed in any preceding claim including the further step of dehydrating the product to produce a rehydratable concentrated fertilizer.

11. An organic fertilizer obtained by a method as claimed in any preceding claim.



INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 84/00407

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC IPC ⁴ : C 05 F 11/00																							
II. FIELDS SEARCHED <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black; margin: 5px 0;">Minimum Documentation Searched ⁷</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%; text-align: left; border-bottom: 1px solid black;">Classification System ¹</th> <th style="width: 70%; text-align: left; border-bottom: 1px solid black;">Classification Symbols</th> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">IPC⁴</td> <td style="padding: 5px;">C 05 F; C 05 G</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black; margin: 5px 0;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸</div>			Classification System ¹	Classification Symbols	IPC ⁴	C 05 F; C 05 G																	
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III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹ <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; text-align: left; border-bottom: 1px solid black;">Category ¹⁰</th> <th style="width: 70%; text-align: left; border-bottom: 1px solid black;">Citation of Document, ¹¹ with Indication, where appropriate, of the relevant passages ¹²</th> <th style="width: 20%; text-align: left; border-bottom: 1px solid black;">Relevant to Claim No. ¹³</th> </tr> <tr> <td style="border-right: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="border-right: 1px solid black; padding: 5px;">GB, A, 664989 (PLANT PROD. LTD.) 16 January 1952 see claims --</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1</td> </tr> <tr> <td style="border-right: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="border-right: 1px solid black; padding: 5px;">GB, A, 2031258 (J.D. WRIGHT & CY.) 23 April 1980 see the entire document --</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1</td> </tr> <tr> <td style="border-right: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="border-right: 1px solid black; padding: 5px;">Chemical Abstracts, vol. 62, 1965 (Columbus, Ohio, US) K.M. Ramanathan et al.: "Composting of seaweeds", see column 15379d, & Madras Agr. J. 51(11), 451-7(1964) (Eng.) --</td> <td></td> </tr> <tr> <td style="border-right: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="border-right: 1px solid black; padding: 5px;">DE, A, 1592577 (BÖTTGER) 14 January 1971 see the entire document --</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1,2</td> </tr> <tr> <td style="border-right: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="border-right: 1px solid black; padding: 5px;">DE, A, 2354270 (A. HÖHN) 7 May 1975 see page 3, line 20 - page 4, line 8 --</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1</td> </tr> <tr> <td style="border-right: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="border-right: 1px solid black; padding: 5px;">US, A, 4336051 (J.U. MARQUEZ) 22 June 1982 --</td> <td style="text-align: center; vertical-align: top; padding: 5px;">./.</td> </tr> </table>			Category ¹⁰	Citation of Document, ¹¹ with Indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	A	GB, A, 664989 (PLANT PROD. LTD.) 16 January 1952 see claims --	1	A	GB, A, 2031258 (J.D. WRIGHT & CY.) 23 April 1980 see the entire document --	1	A	Chemical Abstracts, vol. 62, 1965 (Columbus, Ohio, US) K.M. Ramanathan et al.: "Composting of seaweeds", see column 15379d, & Madras Agr. J. 51(11), 451-7(1964) (Eng.) --		A	DE, A, 1592577 (BÖTTGER) 14 January 1971 see the entire document --	1,2	A	DE, A, 2354270 (A. HÖHN) 7 May 1975 see page 3, line 20 - page 4, line 8 --	1	A	US, A, 4336051 (J.U. MARQUEZ) 22 June 1982 --	./.
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>¹⁴ Special categories of cited documents: ¹⁵</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 50%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"A" document member of the same patent family</p> </div> </div>																							
IV. CERTIFICATION <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-right: 1px solid black; padding: 5px;"> Date of the Actual Completion of the International Search <div style="text-align: center; border: 1px solid black; padding: 2px;">6th March 1985</div> </td> <td style="width: 50%; padding: 5px;"> Date of Mailing of this International Search Report <div style="text-align: center; border: 1px solid black; padding: 2px;">22 AVR. 1985</div> </td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;"> International Searching Authority <div style="text-align: center; border: 1px solid black; padding: 2px;">EUROPEAN PATENT OFFICE</div> </td> <td style="padding: 5px;"> Signature of Authorized Officer <div style="text-align: center;">  G.L.M. Krüvdenberg </div> </td> </tr> </table>			Date of the Actual Completion of the International Search <div style="text-align: center; border: 1px solid black; padding: 2px;">6th March 1985</div>	Date of Mailing of this International Search Report <div style="text-align: center; border: 1px solid black; padding: 2px;">22 AVR. 1985</div>	International Searching Authority <div style="text-align: center; border: 1px solid black; padding: 2px;">EUROPEAN PATENT OFFICE</div>	Signature of Authorized Officer <div style="text-align: center;">  G.L.M. Krüvdenberg </div>																	
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III: DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim 1?
A	DE, A, 1008758 (APPICAT. BIOLOGIQUES) 23 May 1957 --	
P,X	GB, A, 2129785 (A. COOKE) 23 May 1984 see page 1, lines 49-74 -----	1-11

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/GB 8400407 (SA 8395)

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB-A- 664989		None	
GB-A- 2031258	23/04/80	None	
DE-A- 1592577	14/01/71	None	
DE-A- 2354270	07/05/75	None	
US-A- 4336051	22/06/82	None	
DE-A- 1008758		None	
GB-A- 2129785	23/05/84	None	

For more details about this annex :
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